DOCKET NO: 49530/252687 (22100-0100)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	**Carl G. Hellerqvist**		
Application No.:	**09/776,865**	Art Unit:	**1642**
Filed:	**February 2, 2001**	Examiner:	**Stephen L. Rawlings**
For:	**Methods for Preventing or Attenuating Pathoangiogenic Conditions**		

DECLARATION OF DR. CARL G. HELLERQVIST UNDER 37 C.F.R. §1.132

I, Carl G. Hellerqvist, Ph.D., do hereby declare:

1. I am an expert in the field of the invention. I am currently:

Professor at the Department of Biochemistry, Vanderbilt University, Nashville, Tennessee;

Associate Professor at the Department of Medicine (Oncology), Vanderbilt University, Nashville, Tennessee;

Docent at Faculty of Sciences, Stockholms Universitet (Sweden);

Investigator at Vanderbilt Center for Lung Research, Nashville, Tennessee;

Member of Scientific Advisory Committee, Cambridge Healthtech Institute, Newton Upper Falls, Massachusetts;

Participating Faculty in Vanderbilt Ingram Cancer Center, Vanderbilt University, Nashville, Tennessee;

Associate Editor, *Angiogenesis;*

Member of Editorial Board, *International Journal of Modern Cancer Therapy;*

Visiting Professor of Biology, Northwest University, P.R. China;

Member of Special Study Section on Angiogenesis, National Cancer Institute/National Heart, Lung and Blood Institute (NCI/NHLBI);

Member of Special Study Section on Molecular Target Drug Discovery for Cancer, NCI.

I earned an M.S. degree in 1967 at Stockholms Universitet (Sweden). I earned a Ph.D. degree in Chemistry in 1967 at Stockholms Universitet (Sweden). My *curriculum vitae* is enclosed (Exhibit A). I published over of one hundred papers in the fields of biochemistry and cancer studies. The list of the publications is enclosed (Exhibit B).

2. I am a sole named inventor on the U.S. Patent Application Serial Number 09/776,865, filed February 2, 2001, (hereinafter referred to as "the present application"), entitled "Methods for Preventing or Attenuating Pathoangiogenic Conditions." I am familiar with the Office Actions mailed by the United States Patent and Trademark Office in the present application on July 16, 2003 and July 26, 2004, and the Final Office Action mailed by the United States Patent and Trademark Office on February 24, 2005. Specifically, I am familiar with the rejection of Claims 1, 4-16, 29-38, 40-48, 55, and 56 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement

3. As one of ordinary skill in the art in the field of the invention, I declare that, in the field of cancer studies, mouse models are considered by those of ordinary skill in the art as reasonably correlating with the human pathoangiogenic conditions, such as cancer. Those of ordinary skill in the art in the field of cancer studies consider mouse models reasonably predictive of the therapeutic utility of compositions and methods for preventing or attenuating pathoangiogenic conditions, such as cancer. Those of ordinary skill in the art in the field of cancer studies, including members of American Association for Cancer Research (AACR), widely use mouse models to assess and reasonably predict utility of anti-cancer vaccines. For example, during AACR 96th Annual Meeting (April 16-20, 2005,

Anaheim/Orange County, CA) multiple studies using such mouse models were described and discussed (see Exhibits C-D).

4. The disclosure of the present application enables one of ordinary skill in the art in the field of cancer studies to obtain compositions comprising one or more Group B _-hemolytic *Streptococci* toxin receptors or immunogenic fragments thereof, wherein the GBS toxin receptor comprises HP59 and SP55, and to use the compositions to induce or maintain an immune response in a mammal to at least one of the Group B _-hemolytic *Streptococci* toxin receptors, and to prevent or attenuate development of pathoangiogenic conditions, including cancer, in a mammal. For example, Example 6 of the present application shows that immunization by compositions comprising immunogenic fragments of Group B _-hemolytic *Streptococci* toxin receptors prevents intravenously injected melanoma cells from establishing lethal metastases in the lungs.

5. The publication by Fu *et al.* "Identification of a Novel Membrane Protein, HP59, with Therapeutic Potential as a Target of Tumor Angiogenesis" *Clinical Cancer Research*, v. 7, 4182-4194, (2001) (hereinafter *Fu*) shows that the compositions claimed in the present application can be used to prevent or attenuate pathoangiogenic conditions, such as cancer. In particular, *Fu* supplies evidence that the compositions are effective in preventing angiogenesis and pathology characteristic of cancer. *Fu* shows inhibition of Lewis lung tumor growth and reduction in dissemination and growth of metastases. These are the criteria accepted by those of ordinary skill in the art in the field of cancer studies for characterization of effective prevention or attenuation of cancer. Those of ordinary skill in the art in the field of cancer studies know that Lewis tumors are extremely aggressive. *Fu* demonstrates that immunization with a composition comprising HP59-derived peptides resulted in attenuation or prevention of pathologic angiogenesis and vasculogenesis of Lewis tumors, as demonstrated by immunohistochemistry by the absence of CD34- and HP59-positive vessels.

6. Compositions comprising HP59-derived peptides are effective in preventing angiogenesis and pathology characteristic of cancer. See, for example, Wamil et al. (2002), "A cancer vaccine based on the pathoangiogenic marker HP59 gives a cellular immune response protecting against repeated intravenous melanoma infusions in mouse models" (enclosed herewith as Exhibit E).

7. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine, or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardize the validity of any patent issuing on this application.

Signature

Carl G. Hellerqvist, Ph.D.
Name

April 25, 2005
Date

CURRICULUM VITAE

CARL GUSTAF HELLERQVIST

Home address: 2024 Branch Oak Trail
Nashville, Tennessee 37214

Business: Department of Biochemistry
Vanderbilt University School of Medicine
Nashville, Tennessee 37232-0146
Phone: 615-322-4339
Fax: 615-322-6354

Citizenship: U.S.

Education:

1967	Filosophie Kandidat, Stockholms Universitet, (M.S.) Scientific Field: Chemistry, Mathematics
1968	Filosophie Licentiat, Stockholms Universitet, (Ph.D.) Scientific Field: Chemistry
1971	Filosophie Doktor, Docent, Stockholms Universitet Scientific Field: Chemistry, Molecular Biology

Previous Experience:

1967-1978	Instructor, Department of Organic Chemistry, Stockholms Universitet
1969-1971	Assistant Professor, Department of Organic Chemistry, Stockholms Universitet
1971-1972	Visiting Assistant Professor, Department of Biology, The Johns Hopkins University, Baltimore, Maryland
1973-1974	Research Scientist, Department of Biology, The Johns Hopkins University, Baltimore, Maryland
1974-1981	Assistant Professor, Department of Biochemistry, Vanderbilt University, Nashville, Tennessee

Previous Experience: (cont.)

1982-1999	Associate Professor, Department of Biochemistry, Vanderbilt University, Nashville, Tennessee
1980-1984	Director of Graduate Studies, Department of Biochemistry, Vanderbilt University, Nashville, Tennessee
1987-1990	Scientific Advisory Board, Glycomed, Inc., Alameda, CA
1995-1999	Associate Professor, Department of Medicine, Vanderbilt University, Nashville, Tennessee
1999-2001	Director CarboMed Inc
1989-2001	Founder/Consultant, CarboMed, Inc.

Present Positions:

1999-present	Professor, Department of Biochemistry, Vanderbilt University, Nashville, Tennessee
1999-present	Associate Professor, Department of Medicine (Oncology), Vanderbilt University, Nashville, Tennessee
1971-present	Docent, Faculty of Sciences, Stockholms Universitet
1987-present	Investigator, Vanderbilt Center for Lung Research
1994-present	Scientific Advisory Committee, Cambridge Healthtech Institute (New Cancer Strategies)
1994-present	Participating Faculty in Vanderbilt Ingram Cancer Center, Vanderbilt University, Nashville, Tennessee
1997-present	Associate Editor, *Angiogenesis*
1998-present	Editorial Board, *International Journal of Modern Cancer Therapy*
1999-present	Visiting Professor of Biology, Northwest University, P.R. China
1999-present	Member, Special Study Section on Angiogenesis, NCI/NHLBI
2000-present	Member special Study Section on Molecular Target Drug Discovery for Cancer
2000-present	Founder, Director and Chief Scientific Officer for AngioPath Inc

Issued Patents:

1. *Therapeutic Agent and Method of Inhibiting Vascularization of Tumors.* C.G. Hellerqvist, U.S. 5,010,062 - April 23, 1991.

2. *Polysaccharide Toxin from Group B b-Hemolytic Streptococcus (GBS) Having Improved Purity.* C.G. Hellerqvist, U.S. 5,811,403 - September 22, 1998.

3. *Facilitation of Wound Healing with CM101/GBS Toxin.* C.G. Hellerqvist, B.D. Wamil, M. Neeman and R. Abramovitch, U.S. 5,858,991 - January 12, 1999.

4. *Methods for Purifying GBS Toxin/CM101.* C. G. Hellerqvist, U.S. 5,939,396 - August 17, 1999.

5. *Facilitation of Repair of Neural Injury with CM101/GBS Toxin.* C.G. Hellerqvist, A.W. Wamil and B.D. Wamil. U.S. 5,981,508 - November 9, 1999.

6. *Treatment of Chronic Inflammatory Diseases with CM101/GBS Toxin.* C.G. Hellerqvist and B.D. Wamil. U.S. 6,028,060 - February 22, 2000.

7. *Polysaccharide Toxin from Group B b-Hemolytic Streptococcus (GBS) Having Improved Purity.* C.G. Hellerqvist. U.S. 6,136,789 - October 24, 2000.

8. *Methods for Purifying GBS Toxin/CM101.* U.S. 6,407,069 - June 18, 2002.

9. *Facilitation of Repair of Neural Injury with CM101/GBS Toxin.* C.G. Hellerqvist, A.W. Wamil and B.D. Wamil. U.S. 6,476,001 - November 5, 2002.

10. *Treatment of Chronic Inflammatory Diseases with CM101/GBS Toxin.* C.G. Hellerqvist and B.D. Wamil.. U.S. 6,476,002 - November 5, 2002.

11. *Facilitation of Keloid healing with CM101/GBS toxin.* C.G. Hellerqvist, B.D. Wamil, M. Neeman and R. Abramovitch, U.S. 6,569,838 - May 27, 2003.

12. *Facilitation of Wound Healing with CM101/GBS Toxin.* C.G. Hellerqvist, B.D. Wamil, M. Neeman and R. Abramovitch, U.S. 6,670,337 – December 30, 2003.

13. *GBS Toxin Receptor.(HP59 peptide sequences)* C.G. Hellerqvist and Changlin Fu. U.S. 6,803,448 – October 12, 2004

14. *GBS Toxin Receptor. (HP59 as a drug and antibody target)* C.G. Hellerqvist and Changlin Fu. U.S. 2005-0002931-A1 January 6,2005

Pending Patents:

1. *GBS Toxin Receptor Protein and DNA Sequences.* C.G. Hellerqvist and C. Fu. U.S. Patent Application Serial No. 60/093,843. Total of 12 anticipated patents.

2.*Methods for Preventing or Attenuating Pathoangiogenic Conditions.* C.G. Hellerqvist. U.S. C0779-2062.

Book Chapters:

1. Studies on Some Salmonella Lipopolysaccharides. Akademisk avhandling. Stockholm University. C.G. Hellerqvist (1971).

2. Cell Adhesion. C.G. Hellerqvist, W.L. Rottman, B.T. Walter and S. Roseman. Los Alamos Symposium, "Mammalian Cells Probes and Problems," C.R. Richmond, D.F. Peterson, P.R. Mulancy and E.C. Anderson, Editors. ERDA Symp. Series, (1975) Springfield, Va., National Technical Information Service.

3. A Collagenous Component of the Microexudate Carpet Secreted by Attaching Human Fibroblasts. C.E. Schwartz, C.G. Hellerqvist and L.W. Cunningham, Ann. N.Y. Acad. Sci. 312, 450 (1978).

4. Biosynthetic Matrices from Cells in Culture. C.G. Hellerqvist. Methods in Enzymology. L.W. Cunningham, Ed. 82, 530 (1982).

5. Lung Injury by Streptococcal Toxins. H.W. Sundell, W. Fish, K. Sandberg, K.E. Edberg, R.S. Pappas and C.G. Hellerqvist. Vanderbilt University Press (1989).

Honors:

1968 Nils Lofgrens Award for Excellence in Biomedical Research
1969 Nils Lofgrens Award for Excellence in Biomedical Research
1970 Nils Lofgrens Award for Excellence in Biomedical Research
1971 Sigrid Arhenius Award for the Highest Rated Thesis Defended at the Faculty of Science at Stockholm University
1971 Titular Docent of Honor, Stockholm University
1972 Special Fellow of the Jane Coffin Childs Memorial Foundation for Medical Research
1979 **CITATION CLASSIC**. Carl G. Hellerqvist. In Agriculture, Biology and Environmental Sciences 10 #51 for "Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella typhimurium* 395 MS. C.G. Hellerqvist, B. Lindberg, S. Swensson, T. Holme and A.A. Lindberg. Carbohyd. Res. 8:43 (1968).
1982 FASEB Travel Award to Australia
1992 **CITATION CLASSIC**. Björndal, H., Hellerqvist, C. G., Lindberg, B., and Svensson, S. In Physical, Chemical, and Earth Science 6 #4 for "Methylation

Analysis of Polysaccharides. H. Bjorndal, C.G. Hellerqvist, B. Lindberg and S. Swensson. Angew. Chemie 82:643 (1970).

2004 Invited as one of 100 International Investigators to the International Campaign for Cures for spinal cord injury Paralysis (ICCP) Clinical Trials Workshop.

Memberships:

The Society for Neuroscience
American Association for Cancer Research
American Society of Clinical Oncology
Wound Healing Society
Drug Information Association
Society for Glycobiology (formerly Society for Complex Carbohydrates International Society, 700 members - Elected Secretary 1987-93

Meetings:

Organized the 21st Annual Meeting of the Society for Complex Carbohydrates; 36 lecturers, 8 sessions, 280 registered participants, Nashville, Tennessee, November 11 - 14, 1992.

Co-Organizer of the Annual Meeting of the Society for Glycobiology, South Bend, Indiana, November 1993.

Co-Organizer of the XIII International Symposia on Glycoconjugates, Seattle, Washington, August 20 - 26, 1995.

Reviewer for: NIH, Special Study Session on Angiogenesis.
NSF
Journal of Biological Chemistry
Carbohydrate Research
In Vitro
Analytical Biochemistry
Biochemistry
Oncology Research
Journal of the National Cancer Institute

Invited Lectures and Chaired Sessions:

July 19, 2004 VICC Host Tumor Interaction Seminar. " HP59 the target protein for CM101 in pathoangiogenesis and diagnostics. Is there a basis for the concept pathoangiogenesis?"

April 2002 Shenzhen Medical School, China. Medicine Grand Rounds "Pathoangiogenesis – A Key to Treatment of Cancer, Wounds, Trauma, and

	Inflammatory Diseases. Potentials for CM101 and its Target Protein HP59"
December 2001	Shanghai Institute for Pharmaceutical Industry, China. "Therapeutic Potentials for CM101 in Cancer and inflammatory diseases".
June 2001	Angiogenesis: Basic Science and Clinical Development, Crete, Greece
January 2001	Vanderbilt University, Nashville, Tennessee Grand Rounds in Medicine:
December 2000	University of Texas Medical Branch, NIEHS Center, Galveston, Texas: "CM101 and its receptor HP59 in pathoangiogenic disease processes"
November 2000	University of Louisiana, Baton Rouge: "CM101 and HP59: Potential Clinical Applications"
August 2000	International Carbohydrate Symposia, Hamburg, Germany: "Studies on CM101 and its target receptor HP59 in pathoangiogenic dependent disease processes"
April 2000	ACS Lecture, Middle Tennessee State University, Murfreesboro, Tennessee
November 1999	Karolinska Institute, Stockholm, Sweden: "Anti-Pathoangiogenics: Drugs for the Future"
November 1999	Angiogenesis Conference (International Business Communications): "CM101: An Anti-Pathoangiogenic Agent and its Receptor CM201 - Areas of Application"
October 1999	Society for Neuroscience 29th Annual Meeting: "Recovery of Neurologic Function with CM101 Treatment after Surgical Removal of Gliosis in Chronic Spinal Cord Injury"
October 1999	Angiogenesis '99, London, England: "CM101: An Anti-Pathoangiogenic Agent and its Receptor CM101 - Areas of Applications"
August 1999	Glyco XV: "CM101-Mediated Recovery of Walking Ability in Adult Mice Paralyzed by Spinal Cord Injury"
July 1999	NATO/ASI - Angiogenesis: From the Molecular to Integrative Pharmacology, Crete, Greece: "CM101: An Anti-Pathoangiogenic Polysaccharide - Harnessing a Powerful Array of Biological Effects"
May 1999	Karolinska Institute, Stockholm, Sweden: "Recovery of Neurologic Function with CM101 Treatment after Surgical Removal of Gliosis in Chronic Spinal Cord Injury"
May 1999	Paris / Milan / Berlin Lectures to Pharmaceutical companies

March 1999	Angiogenesis - Novel Therapeutic Development, Boston, Massachusetts: "CM101: An Anti-Pathoangiogenic Agent and its Receptor CM201 - Areas of Application"
November 1998	1st International Conference on Biological Therapy and Modern Cancer Therapy, Guangzhou and Hong Kong, China: "CM101: An Anti-Pathoangiogenic Polysaccharide Reduces Immunoprivilege of Tumors"
November 1998	Glycocompounds 98, Vancouver, British Columbia: "CM101: An Anti-Pathoangiogenic Polysaccharide - Harnessing a Powerful Array of Biological Effects"
October 1998	Impact of Biotechnology on Prediction, Prevention and Treatment, Nice, France: "CM101: An Anti-Pathoangiogenic Polysaccharide Reduces Immunoprivilege of Tumors"
September 1998	Acute Neuronal Injury: New Therapeutic Opportunities, Las Vegas, Nevada
August 1998	19th International Carbohydrate Symposium, San Diego, California: "CM101: An Anti-Pathoangiogenic Polysaccharide -Harnessing a Powerful Array of Biological Effects"
June 1998	10th NCI-EORTC Symposium on New Drugs in Cancer Therapy, Amsterdam, The Netherlands: "An Anti-Pathoangiogenic Polysaccharide Induces Apoptosis in Adenocarcinoma Metastasis"
May 1998	International Glyco-BioTechnology Symposium, Braunschweig, Germany: "CM101: An Anti-Pathoangiogenic Polysaccharide - Harnessing a Powerful Array of Biological Effects"
April 1998	IBC's 4th Annual Conference on Angiogenesis, Boston, Massachusetts: "CM101 - An Anti-Pathoangiogenic Agent: Clinical and Preclinical Experiences"
March 1998	Keystone Symposia on Molecular Biology of the Cardiovascular System, Steamboat Springs, Colorado: "Clinical and Pre-Clinical Studies on CM101, an Anti-Pathoangiogenic Agent"
October 1997	CHI - Angiogenesis Antagonists: Current Clinical Trials, Drug Development, and Regulatory Issues, Hamilton, Bermuda
July 1997	Mount Sinai Grand Rounds, New York, New York: "CM101: The Evolution of an Anti-Pathoangiogenic Agent from a Neonatal Pathogen"
June 1997	NATO-Advanced Study Institute on Angiogenesis: Models, Modulators and

	Clinical Applications, Kos, Greece: "Clinical Development and Mode of Action of CM101 as an Anti-Tumor Agent Targeting the Neovasculature"
April 1997	ACS Symposium on Carbohydrate-Based Anti-Inflammatory Chemotherapy, San Francisco, California: "Clinical and Preclinical Evidence for a Mechanism of Action of CM101 - An Anti-Tumor Agent Targeting Pathogenic Neovasculature"
February 1997	IBC Third Annual Conference on Angiogenesis, Boston, MA: "Evolution of an Anti-Neovascularization Agent from a Neonatal Pathogen"
February 1997	AACR Meeting on Cell Signaling and Cancer Treatment, Telfs-Buchen, Austria: "Clinical and Preclinical Evidence for a Mechanism of Action of CM101 - An Anti-Tumor Agent Targeting Pathologic Neovasculature"
October 1996	Third International Symposium on Impact of Cancer Biotechnology, Nice, France: "CM101 - AntiTumor Activity and Mechanism of Action as an Anti-Neovascularization Agent"
October 1996	Third International Symposium on Impact of Cancer Biotechnology, Nice, France *(Chairman, Session on "Angiogenesis")*
August 1996	Sixth World Congress for Microcirculation, Munich, Germany: "Evolution of an Anti-Neovascularization Agent from a Neonatal Pathogen"
April 1996	Third Annual Angiogenesis Antagonists (CHI), Boston, MA *(Chairman, Session on "Clinical Trial Updates")*
April 1996	Third Annual Angiogenesis Antagonists (CHI), Boston, MA: "CM101: Clinical Evidence for Mechanism of Action as an Anti-Neovascularization Agent"
February 1996	Weizmann Institute of Science, Rehovot, Israel: "Molecular Pathophysiology and Clinical Development of CM101-GBS Toxin: an Anti-Neovascularization Agent in Anti-Cancer Treatment"
February 1996	Hadassah Medical Organization, Jerusalem, Israel: "Evolution of an Anti-Neovascularization Agent from a Neonatal Pathogen"
February 1996	Tel Aviv University, Tel Aviv, Israel: "Preclinical and Clinical Evidence for a Mechanism of Action of CM101 - An Anti-Tumor Agent Targeting Pathologic Neovasculature"
February 1996	Gordon Conference on Drug Carriers in Medicine and Biology, Ventura, Californi
October 1995	Karolinska Institute, Center for Microbiology and Tumor Biology, Stockholm, Sweden: "Molecular Pathophysiology and Clinical Development of CM101-

GBS Toxin: An Anti-Neovascularization Agent in Anti-Cancer Treatment"

October 1995 — University of Upsala, Upsala, Sweden: "Molecular Pathophysiology and Clinical Development of CM101-GBS Toxin: An Anti-Neovascularization Agent in Anti-Cancer Treatment"

October 1995 — University of Gothenburg, Gothenburg, Sweden: "Molecular Pathophysiology and Clinical Development of CM101-GBS Toxin: An Anti-Neovascularization Agent in Anti-Cancer Treatment"

October 1995 — University of Stockholm, Dept. of Organic Chemistry, Lund, Sweden: "Molecular Pathophysiology and Clinical Development of CM101-GBS Toxin: An Anti-Neovascularization Agent in Anti-Cancer Treatment"

October 1995 — Lund University, Dept. of Medical Microbiology, Lund, Sweden: "Molecular Pathophysiology and Clinical Development of CM101-GBS Toxin: An Anti-Neovascularization Agent in Anti-Cancer Treatment"

September 1995 — The Vanderbilt Cancer Center, Nashville, Tennessee: "Evolution of an Antitumor Agent from a Neonatal Pathogen"

August 1995 — Gordon Conference on Angiogenesis and Microcirculation, Newport, Rhode Island: "Evolution of an Anti-Neovascularization Agent from a Neonatal Pathogen"

August 1995 — XIII International Symposia on Glycoconjugates, Seattle, Washington *(Chairman, Session on "Role of Glycoconjugates in Bacterial and Viral Infections")*

August 1995 — XIII International Symposia on Glycoconjugates, Seattle, Washington; "The Evolution of an Anti-Tumor Agent from a Neonatal Pathogen"

August 1995 — XIII International Symposia on Glycoconjugates, Seattle, Washington *(Chairman, Plenary Lecture on Microbial Adhesion)*

July 1995 — 7th European Workshop Conference on Bacterial Protein Toxins, Hindsgal, Middelfart, Denmark: "The Evolution of an Anti-Neovascularization Agent from a Neonatal Pathogen"

July 1995 — 19th International Congress of Chemotherapy, Montreal, Quebec, Canada: "Systemic Cytokine Levels in Cancer Patients Receiving the Anti-Neovascularization Drug CM101"

June 1995 — 3rd NATO Advanced Study Institute on Angiogenesis, Porto Carras, Greece:

	"CM101: Pre-clinical and Clinical Evidence for Targeting Pathologic Neovasculature in Tumors"
June 1995	3rd NATO Advanced Study Institute on Angiogenesis, Porto Carras, Greece *(Chairman, Session on "Inhibitors of Angiogenesis")*
May 1995	Glycoday III, Annapolis, Maryland
May 1995	Advances in Glycotechnology, San Diego, CA: "Carbohydrates in the Clinic"
April 1995	New Cancer Strategies: Angiogenesis Antagonists, Washington, DC *(Chairman, Session on "Clinical Results")*
April 1995	New Cancer Strategies: Angiogenesis Antagonists, Washington, DC: "CM101: Evidence for Targeting Tumor Neovascularization"
March 1995	National Institutes of Health - Angiogenesis Group, Washington, DC
February 1995	Harvard Medical School, Boston, Massachusetts: "The Evolution of an Anti-Neovascularization Agent from a Neonatal Pathogen"
February 1995	Harvard Medical School, Oncologic Nuclear Medicine, Joint Program in Nuclear Medicine Conference, Boston, Massachusetts: "The Evolution of an Anti-Tumor Agent from a Neonatal Pathogen"
1994	Cancer Clinical Trials: New Challenges in Cancer Research, Philadelphia, Pennsylvania: "CM101 (GBS Toxin): Clinical Evidence for a Tumor-Targeted Induction of Inflammation"
1994	Johns Hopkins University, Department of Pharmacology and Molecular Sciences: "Evolution of an Anti-Tumor Agent from a Neonatal Pathogen"
1994	Johns Hopkins School of Medicine: "Clinical Evaluation of a Bacterial Polysaccharide as an Anti-Tumor Agent"
1994	Society for Leukocyte Biology, Tucson, Arizona: "Preliminary Results of a Phase I Trial of CM101 in Cancer Patients"
1994	9th Mediterranean Congress of Chemotherapy, Milan, Italy; "CM101 (GBS Toxin): Preclinical and Clinical Evidence for a Tumor-Targeted Induction of Inflammation"
1994	Glycoday II, Annapolis, Maryland: "Glycobiology Cures Cancer"
1994	The Second Annual Conference on Glycotechnology, San Diego, California: "Developments in Clinical and Basic Science of CM101"

1993 Complex Carbohydrates in Biology and Medicine, Frisco, Colorado: "Evolution of an Anti-Tumor Agent from a Neonatal Pathogen"

1994 Glycotechnology -- Development and Commercialization of Carbohydrate-Based Therapeutics, International Business Communications, Washington, DC *(Chairman, Session on "Applications - Clinical and Pre-Clinical Results")*

1994 Glycotechnology -- Development and Commercialization of Carbohydrate-Based Therapeutics, International Business Communications, Washington, DC: "Evolution of an Anti-Tumor Agent from a Neonatal Pathogen"

1993 22nd Annual Meeting of the Society for Complex Carbohydrates, San Juan, Puerto Rico: "Evolution of an Anti-Tumor Agent from a Neonatal Pathogen"

1993 22nd Annual Meeting of the Society for Complex Carbohydrates, San Juan, Puerto Rico *(Chairman, Special Session)*

1993 New Cancer Strategies: Angiogenesis & Angiogenesis Antagonists, Cambridge Healthtech Institute: "GBS Toxin: From Neonatal Pathogen to Anti-Tumor Agent" *(Chairman)*

1993 Institut für Organische Chemie und Biochemie, Universität, Bonn, Bonn, Germany: "Evolution of an Anti-Tumor Agent from a Neonatal Pathogen"

1993 Glaxo Research Institute, Research Triangle Park, North Carolina: "GBS Toxin, A Novel Anti-Tumor Agent"

1993 International Symposium on Glycoconjugates (Glyco XII), Kraków, Poland: "GBS Toxin: An Inflammatory Agent With Anti-Tumor Activity"

1993 NATO/ASI - Angiogenesis: Molecular Biology, Clinical Aspects, Rhodes, Greece: "Anti-Tumor Effects of GBS Toxin are Caused by Induction of a Targeted Inflammatory Reaction"

1993 18th International Congress of Chemotherapy, Stockholm, Sweden: "Anti-Tumor Effects of GBS Toxin: Caused by Induction of a Targeted Inflammatory Reaction"

1993 Pulmonary Medicine Conference, Vanderbilt University: "GBS Toxin: A Potential Anti-Metastatic Agent"

1993 Neonatal-Pulmonary Research Conference, Vanderbilt University: "GBS Toxin: A Potential Anti-Metastatic Agent"

1993 Clinical Research Center, Harrow, England: "GBS Toxin: A Potential Anti-Metastatic Agent"

1994	Cancer Research Campaign, Gray Laboratory, Northwood, England: "GBS Toxin: A Potential Anti-Metastatic Agent"
1993	Zeneca (ICI), Manchester, England: "GBS Toxin: A Potential Anti-Metastatic Agent"
1993	Georgetown University, Department of Cell Biology, Washington, DC: "GBS Toxin: A Potential Anti-Metastatic Agent"
1993	22nd Annual Keystone Symposium, Silverthorne, Colorado: "Anti-Tumor Effects of GBS Toxin are Caused by Induction of a Targeted Inflammatory Reaction"
1992	Grand Rounds, Department of Pathology, Vanderbilt University: "GBS Toxin: A Potential Anti-Metastatic Agent"
1992	21st Annual Meeting of the Society for Complex Carbohydrates, Nashville, Tennessee, U.S.A.: "Anti-Tumor Effects of GBS Toxin are Caused by Induction of a Targeted Inflammatory Reaction"
1992	XVIth International Carbohydrate Symposium on Carbohydrate Chemistry, Paris, France: "A Micro Analytical Method for Quantitative and Qualitative Carbohydrate Structural Analysis"
1991	XVIth International Symposium on Glycoconjugates, Toronto, Canada: "GBS Toxin; From Neonatal Pathogen to Anti-Tumor Agent"1991 University of Illinois at Chicago: "GBS Toxin; From Neonatal Pathogen to Anti-Tumor Agent"
1991	Gordon Research Conference on Molecular Mechanism on Microbial Adhesion: "Mechanism Induction of GBS Induced Inflammatory Response"
1989	XV International Symposium on Glycoconjugates, Jerusalem, Israel *(Chairman, Section on "Analytical Techniques")*
1989	Biomembrane Institute, Washington State University, Seattle, WA: "GBS Toxin as a Biological Response Modifier in Cancer Therapy"
1989	Milligene Corporation, Bedford, MA: "Sequence Analysis of Carbohydrates"
1989	Waters, Millford MA: "Methods in Analytical Carbohydrate Chemistry"

1988	University of Michigan, Ann Arbor, MI: "Molecular Basis for Group B Streptococcal Disease"
1988	University of Gothenburg, Gothenburg, Sweden: "Group B Streptococcus"
1988	International Conference on Carbohydrate Chemistry, Stockholm, Sweden: "Sequence Analysis of Polysaccharides"
1988	NIH Division of Carbohydrate Chemistry: "GBS Toxin"
1980-87	Invited lectures at Stockholm University, Uppsala University, Ohio State University, University of Miami, and Johns Hopkins University
1970-80	Invited lectures at MIT, Berkeley, Stanford, Johns Hopkins, Penn State, Max Plank Freiburg, Pasteur Institute-Paris France, University of Washington, University of Michigan, Michigan State, University of Wisconsin, Mass. General-Harvard, FEBS-Symposium Helsinki Finland, Ohio State, Gordon Conference on Carbohydrates, FASEB Symposium on Cell-Cell Interactions *(Chairman)*, and University of Chicago.

Publications:

1 Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella typhimurium* 395 MS. C.G. Hellerqvist, B. Lindberg, S. Svensson, T. Holme and A.A. Lindberg. Carbohyd. Res. 8:43 (1968) **(Citation Classic in 1979)**.

2. Methylation Analysis of Polysaccharides. H. Bjorndal, C.G. Hellerqvist, B. Lindberg and S. Svensson. Angew. Chemie 82:643 (1970) **(Citation Classic in 1992)**.

3. Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella typhimurium* LT2. C.G. Hellerqvist, B. Lindberg, S. Svensson, T. Holme and A.A. Lindberg. Carbohyd. Res. 9:237 (1969).

4. Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella typhi* and *Salmonella enteritidis*. C.G. Hellerqvist, B. Lindberg, S. Svensson, T. Holme and A.A. Lindberg. Acta. Chem. Scand. 23:1588 (1969).

5. Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella bredeney*. C.G. Hellerqvist, B. Lindberg, S. Svensson, T. Holme and A.A. Lindberg. Acta. Chem. Scand. 23:2217 (1969).

6. Bacteriophage Receptor Development and Synthesis of O-Specific Side Chains after Addition of d-Galactose to the Uridine Diphosphate-Galactose-4-Epimeraseless Mutant. A.A. Lindberg, T. Holme, C.G. Hellerqvist and S. Svensson. J. Bact. 102:540 (1970).

7. Methylation Analysis of Pustulan. C.G. Hellerqvist, B. Lindberg and K. Samuelsson. Acta Chem. Scand. 22:2736 (1968).

8. Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella strasbourg*. C.G. Hellerqvist, B. Lindberg, A. Pilotti and A.A. Lindberg. Acta Chem. Scand. 24:1168 (1970).

9. Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella newport* and *S. kentucky*. C.G. Hellerqvist, B. Lindberg, S. Svensson and A.A. Lindberg. Carbohydr. Res. 14:17 (1970).

10. Structural Investigations of T1 Lipopolysaccharides. M. Berst, C.G. Hellerqvist, B. Lindberg, S. Svensson, O. Luderitz and O. Westphal. European Journal of Biochemistry 11:353 (1969).

11. Structural Studies on the Cell-Wall Lipopolysaccharide from *Salmonella muenster*. C.G. Hellerqvist, B. Lindberg, J. Lonngrenn, and A.A. Lindberg. Carbohyd. Res. 16:289 (1971).

12. Structural Studies on the Common Core Polysaccharide of the Cell-Wall Lipopolysaccharide from *Salmonella typhimurium*. C.G. Hellerqvist and A.A. Lindberg. Carbohyd. Res. 16:39

(1971).

13. Bacteriophage Attachment Sites, Serological Specificity, and Chemical Composition of the Lipopolysaccharides of Semi-rough and Rough Mutants of *Salmonella typhimurium*. A.A. Lindberg and C.G. Hellerqvist. J. Bact. 105:57 (1971).

14. Fragmentation Analysis of the *Salmonella newport* Lipopolysaccharide. C.G. Hellerqvist, B. Lindberg, J. Lonngren and A.A. Lindberg. Acta Chem. Scand. 26:601 (1971).

15. Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella senftenberg*. C.G. Hellerqvist, B. Lindberg, A. Pilotti and A.A. Lindberg. Carbohyd. Res. 16:297 (1971).

16. Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella newington*. C.G. Hellerqvist, B. Lindberg, J. Lonngren and A.A. Lindberg. Acta Chem. Scand. 25:939 (1971).

17. Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Salmonella paratyphi*, A Variant Durazzo. C.G. Hellerqvist, B. Lindberg, K. Samuelsson and A.A. Lindberg. Acta Chem. Scand. 25:955 (1971).

18. Structure of an Oligosaccharide Obtained on Degradation of the Lipopolysaccharide from *Salmonella typhimurium* LT2. C.G. Hellerqvist, B. Lindberg, O. Larm and A.A. Lindberg. Acta Chem. Scand. 25:744 (1971).

19. NMR Spectra of Trimethylsilylated Oligosaccharides and their Alditols. C.G. Hellerqvist, B. Lindberg and O. Larm. Acta Chem. Scand. 25:743 (1971).

20. Anomeric Nature of the D-Mannose Residues in the *Salmonella typhi* and *S. strasbourg* Lipopolysaccharides. C.G. Hellerqvist, J. Hoffman, B. Lindberg, A. Pilotti, and A.A. Lindberg. Acta Chem. Scand. 25:1512 (1971).

21. The Smooth Lipopolysaccharide Character of 1, 4, (5), 12 and 1, 9, 12 Transductants Formed as Hybrids Between Groups B and D of *Salmonella*. M. Nurminen, C.G. Hellerqvist, V.V. Valtonen and H.P. Makela. European J. Biochem. 22:500 (1971).

22. Structural Studies on the O-Specific Side-chains of the Cell-Wall Lipopolysaccharides from *Pasteurella pseudotuberculosis* group IIB. C.G. Hellerqvist, B. Lindberg, K. Samuelsson and R.R. Brubaker. Acta Chem. Scand. 26:394 (1972).

23. Structural Studies on the O-Specific Side-Chains of the Cell-Wall Lipopolysaccharide from *Pastuerella pseudotuberculosis* Group IIA. C.G. Hellerqvist, B. Lindberg, K. Samuelsson and R.R. Brubaker. Acta Chem. Scand. 26:1389 (1972).

24. Glycans from Streptococcal Cell Walls. The Molecular Structure of an Antigen

Diheteroglycan of Glucose and Galactose from *Streptococcus faecalis*. J.H. Pazur, Judith A. Kane and C.G. Hellerqvist. J. Biol. Chem. 248:279 (1973).

25. The Group C_2-type Modification of the B-type Lipopolysaccharide in a Hybrid Between *Salmonella* Groups B and C_2. C.G. Hellerqvist, Ulla Ryden and P. Helena Makela. Eur. J. Biochem. 25:96 (1972).

26. Studies of a L1-Hapten Isolated from Cell-Walls of the Rough Mutant *Salmonella typhimurium* 395 MR10. A.A. Lindberg, C.G. Hellerqvist and S. Svensson. Acta Path. Microbiol. Scand. 80:743 (1972).

27. Anomeric Structures of Globoside and Ceramide Trihexoside of Human Erythrocytes and Hamster Fibroblasts. S.I. Hakomori, Y.T. Siddiqui, L.S. Li and C.G. Hellerqvist. J. Biol. Chem. 246:2271 (1971).

28. Sequence Analysis of the Polysaccharides from *Salmonella newport* and *Salmonella kentucky*. C.G. Hellerqvist, J. Hoffman, A.A. Lindberg, B. Lindberg and S. Svensson. Acta Chem. Scand. 26:3282 (1972).

29. Studies on Lipopolysaccharides from *Yersinia pseudotuberculosis*. R.R. Brubaker, C.G. Hellerqvist, B. Lindberg and K. Samuelsson. Contributions to Microbiology and Immunology, Vol. 2 (1973) S. Winblad, Editor, S. Karger, Publisher, Basel, Switzerland.

30. A Quantitative Assay for Concanavalin A Mediated Cell Agglutination. W.L. Rottman, B.T. Walter, C.G. Hellerqvist, J. Umbreit and S. Roseman. J. Biol. Chem. 249:373 (1974).

31. Lipopolysaccharide Modification Accompanying Antigenic Conversion by Phage P27. A.A. Lindberg, C.G. Hellerqvist, G. Bagdian-Motta and P.H. Makela. J. Gen. Microbiol. 197:279 (1978).

32. Scanning Electron Microscopic Visualization of a Microexudate Prepared by the Release of Cells by Urea. C.E. Schwartz, L. Hoffman, C.G. Hellerqvist and L.W. Cunningham. Exp. Cell Res. 118:427 (1979).

33. Attaching Human Fibroblasts Secrete A Type I Procollagen Rich in 3-Hydroxy-proline. C.E. Schwartz, C.G. Hellerqvist and L.W. Cunningham. Biochem. Biophys. Res. Comm. 90:240 (1979).

34. Intercellular Adhesion as a Function of the Cell Cycle Traverse. C.G. Hellerqvist. J. Cell Biol. 82:682 (1979).

35. Rough Mutants of *Salmonella typhimurium*: Immunochemical and Structural Analysis of Lipopolysaccharides from rfaH mutants. A.A. Lindberg and C.G. Hellerqvist. J. Gen. Microbiol. 116:25 (1980).

36. Serological Groups of Neisseria Gonorrhoea Isolated from Patients in Nashville, Tennessee.

R.W. Quinn, P.N. Lowry, and C.G. Hellerqvist. Sexually Transmitted Diseases 7:44 (1980).

37. Studies on Group B b-Hemolytic *Streptococcus*. I. Isolation and Partial Characterization of an Extracellular Toxin. C.G. Hellerqvist, J. Rojas, R.S. Green, S. Sell, H. Sundell and M.T. Stahlman. Pediatric Res. 15:892 (1981).

38. Studies on Group B b-Hemolytic *Streptococcus*. II. Effects on Pulmonary Hemo-dynamics and Vascular Permeability in Unanesthetized Sheep. J. Rojas, R.S. Green, C.G. Hellerqvist, R. Olegard, K.L. Brigham and M.T. Stahlman. Pediatric Res. 15:899 (1981).

39. Toxic Activity of Purified Gonococcal Lipopolysaccharide for Human Fallopian Tube Mucosa. C.R. Gregg, M.A. Melly, C.G. Hellerqvist, J.G. Coniglio and Z.A. McGee. J. Inf. Diseases. 143:432 (1981).

40. Studies on Intercellular Adhesion. I. Induction of Cell Adhesion by Multivalent Ligands. K. Krueger and C.G. Hellerqvist. J. Biol. Chem. 256:8553 (1981).

41. Identification of a 2-Amino-Tetrose in Lipid-Oligosaccharides of Rat Liver. D.A. Cumming, C.G. Hellerqvist and O. Touster. J. Biol. Chem. 256:7723 (1981).

42. Studies on Intercellular Adhesion. II. Mechanism of Induction of Cell Adhesion. K.E. Krueger and C.G. Hellerqvist. J. Biol. Chem. 256:10684 (1981).

43. Direct Evidence that Bacterial Lipopolysaccharides Elevate Cyclic-GMP Levels in Rat Fetal Liver Cells. S.E. Graber and C.G. Hellerqvist. J. Biol. Chem. 257:5414 (1982).

44. The Repeating Sequence of the Capsular Polysaccharide of *Staphylococcus Aureus*. S.V.K.N. Murthy, M.A. Melly, T.M. Harris, C.G. Hellerqvist and J.H. Hash. Carbohyd. Res. 117:113 (1983).

45. Pulmonary Hemodynamic and Ultrastructural Changes Associate with Group B b-Hemolytic *Streptococcal* Toxemia in Adult Sheep & Newborn Lambs. J. Rojas, L.E. Larrson, C.G. Hellerqvist, K.L. Brigham, M.E. Gray and M.T. Stahlman. Pediatric Res. 17:1002 (1983).

46. Effects of Methylprednisolone on the Response to Group B b-Streptococcal Toxin in Sheep. J. Rojas, C.G. Hellerqvist, M.L. Ogeltree, K.L. Brigham and M.T. Stahlman. Pediatric Res. 18:1141 (1984).

47. The Role of Granulocytes in the Pulmonary Response to Group B *Streptococcal* Toxin in Young Lambs. B. Engelhardt, K. Sandberg, D. Bratton, A. Van den Abbeele, J. Grogaard, C. Hellerqvist and H. Sundell. Pediatric Res. 21:159 (1987).

48. Molecular Basis for Group B b-Hemolytic Streptococcal Disease. C.G. Hellerqvist, H. Sundell and P. Gettins. Proc. Natl. Acad. Sci., U.S.A. 84:51 (1987).

49. Pulmonary Response to Group B Streptococcal Toxin in Young Lambs. K. Sandberg, B. Engelhart, C.G. Hellerqvist and H. Sundell. J. Appl. Physiol. 63:2024 (1987).

50. On the Utility of ^{13}C-NMR Spectroscopy in the Identification of the Primary Structures of Manno-Oligosaccharides and Glycopeptides. D. Cumming and C.G. Hellerqvist. Carbohyd. Res. 179:369 (1988).

51. Structures of Asparagine-linked Oligosaccharides of the Glycoprotein Fetuin having Sialic Acid Linked to N-acetylglucosamine. D.A. Cumming, C.G. Hellerqvist, M. Harris-Brandts, S.W. Michnick, Jeremy P. Carver and Brad Bendiak. Biochemistry 28:6500 (1989).

52. Mass Spectrometry of Carbohydrates. C.G. Hellerqvist and B. Sweetman, "Biomedical Applications of Mass Spectrometry," C.H. Suelter and J.T. Watson, Editors. Methods of Biochemical Analysis, Volume 34:91 (1989).

53. Oligosaccharide Monomer Sequence Determination Using Fast-Atom Bombardment Mass Spectrometry of Periodate Oxidized Acetate Ester Derivatives. R.S. Pappas, B. Sweetman, S. Ray and C.G. Hellerqvist. Carbohyd. Res. 197:1 (1990).

54. Linkage Analysis by Permethylation. C.G. Hellerqvist in Mass Spectrometry. Methods in Enzymology. J.A. McCloskey, Ed. 193:554 (1990).

55. Group B Streptococcus Toxin: A Phase I Trial. D.H. Johnson, F.A. Greco, J.D. Hainsworth and C.G. Hellerqvist. FDA BB-IND 4578 (1991).

56. Anti-Tumor Effects of GBS Toxin: A Polysaccharide Exotoxin from Group B b-Hemolytic *Streptococcus*. Carl G. Hellerqvist, Gary B. Thurman, David L. Page, Yue-Fen Wang, Bruce A. Russell, Charles A. Montgomery and H.W. Sundell. J. Can. Res. Clin. Oncol. 120:63-70 (1993).

57. Anti-Tumor Effects of GBS Toxin are Caused by Induction of a Targeted Inflammatory Reaction. Carl G. Hellerqvist, Gary B. Thurman, Bruce A. Russell, David L. Page, Gerry E. York, Yue-Fen Wang, Carlos Castillo and H.W. Sundell. NATO/ASI Series - Angiogenesis: Molecular Biology, Clinical Aspects. M.E. Maragoudakis, P.M. Gullino and P.I. Lelkes, Eds. Plenum Press Publishers, New York and London. Series A: Life Sciences Vol. 263, pages 265-269 (1993).

58. Anti-Tumor Effects of GBS Toxin: Caused by Induction of a Targeted Inflammatory Reaction. Carl G. Hellerqvist, Gary B. Thurman, Bruce A. Russell, David L. Page, Gerry E. York, Yue-Fen Wang, Carlos Castillo and H.W. Sundell. Recent Advances in Chemotherapy (Proceedings of the 18th International Congress of Chemotherapy). Jerzy Einhorn, Carl Erik Nord and S. Ragnar Norrby, Editors. American Society for Microbiology, Washington, DC. Pages 797-798 (1993).

59. Thromboxane Receptor Blockage (SQ 29548) in Group B Streptococcal (GBS) Toxin Challenge in Young Lambs. Kenneth Sandberg, Karl Erik Edberg, Wendy Fish, Robert Parker, Carl Hellerqvist and Hakan Sundell. Pediatric Res. 35:571-579 (1994).

60. Effects of GBS Toxin on Long-Term Survival of Mice Bearing Transplanted Madison Lung Tumors. Gary B. Thurman, Bruce A. Russell, Gerald E. York, Yue-Fen Wang, David L. Page, Hakan W. Sundell and Carl G. Hellerqvist. J. Can. Res. Clin. Oncol. 120:479-484 (1994).

61. Endogenous Na^+-pump Inhibitors in Rats: Distribution, Purification, Identification and Physiological Significance. Masaaki Tamura, Thomas M. Harris, Sau Kuen Lam, Dennis Phillips, Ian A. Blair, Yue-Fen Wang, Carl G. Hellerqvist and Tadashi Inagami. Therapeutic Res. 15:79 (1994).

62. Identification of Two Cardiac Glycosides as Na^+-pump Inhibitors in Rat Urine and Diet. Masaaki Tamura, Thomas M. Harris, Dennis Phillips, Ian A. Blair, Yue-Fen Wang, Carl G. Hellerqvist, Sau Kuen Lam and Tadashi Inagami. J. Biolog. Chem. 269:11972-11979 (1994).

63. CM101, a Polysaccharide Anti-Tumor Agent, Does Not Inhibit Wound Healing in Murine Models. Thomas E. Quinn, Gary B. Thurman, Ann-Kristen Sundell, Minghua Zhang and Carl G. Hellerqvist. J. Can. Res. Clin. Oncol. 121:253-256 (1995).

64. Modulation of Interleukin-12 mRNA Expression in Leukocytes of Cancer Patients Treated with CM101. C.G. Hellerqvist, Steve Lloyd, Enze Wang and Smriti Bardhan. Annals of the New York Academy of Sciences Interleukin 12: Cellular and Molecular Immunology of an Important Regulatory Cytokine 795:346-348 (1995).

65. Acute Inflammatory Changes in Subcutaneous Microtumors in Mice Ears Induced by Intravenous CM101 (GBS Toxin). G.B. Thurman, D.L. Page, B.D. Wamil, L.E. Wilkinson, M. Kasami and C.G. Hellerqvist. J. Can. Res. Clin. Oncol. 122:549-553 (1996).

66. Quantification of Tumor Vascularity and Flow with Amplitude Color Doppler Sonography in an Experimental Model: Preliminary Results. Colin B. Meyerowitz, Arthur C. Fleischer, David R. Pickens, Gary B. Thurman, Alexander D. Borowsky, Graham Thirsk and Carl G. Hellerqvist. J. Ultrasound in Med. 15:827-833 (1996).

67. Soluble E-Selectin in Cancer Patients as a Marker of the Therapeutic Efficacy of CM101, a Tumor Inhibiting Agent, Evaluated in Phase I Clinical Trial. Barbara D. Wamil, Gary B. Thurman, Russell F. DeVore, Gail Wakefield, David H. Johnson and Carl G. Hellerqvist. J. Can. Res. Clin. Oncol. 123(3):173-179 (1997).

68. A Phase I Study of the Antineovascularization Drug CM101. Russell F. DeVore, Carl G. Hellerqvist, Gail B. Wakefield, Barbara D. Wamil, Gary B. Thurman, Patricia A. Minton, Hakan W. Sundell, He-Ping Yan, Clint E. Carter, Yue-Fen Wang, Gerald E. York, Ming-Hua

Zhang and David H. Johnson. J. Clin. Can. Res. 3:365-372 (1997).

69. CM101 - An Anti-Pathoangiogenic Agent: Pre-clinical and Clinical Experiences. Carl G. Hellerqvist. NATO/ASI Series - Angiogenesis: Models, Modulators, and Clinical Applications. M.E. Maragoudakis, Ed. Plenum Press Publishers, New York and London. Series A: Life Sciences Vol. 298, pages 449-455 (1997).

70. CM101-Mediated Recovery of Walking Ability in Adult Mice Paralyzed by Spinal Cord Injury. Artur W. Wamil, Barbara D. Wamil and Carl G. Hellerqvist. Proc. Natl. Acad. Sci. USA 95(22):13188-13193 (1998).

71. Functional Studies on the Anti-Pathoangiogenic Properties of CM101. He-ping Yan, Clint E. Carter, En-ze Wang, David L. Page, Kay Washington, Barbara D. Wamil, F. Michael Yakes, Gary B. Thurman and Carl G. Hellerqvist. Angiogenesis 2(3):219-233 (1998).

72. A Quantitative Assay Using Basement Membrane Extracts and Embryonic Stem Cells to Study the Effects of Estrogen on Developing Vascular Endothelium *In Vivo*. C. Venkov, N. Vorobieff, B. Wamil, F. Sun, M. Yakes, and C. Hellerqvist. Proceedings of the 20th European Conference on Microcirculation. P.H. Carpentier, E. Vicaut and J.-L. Guilmot, Eds. Monduzzi Editore. Pages 213-217 (1998).

73. Quantified Color Doppler Sonography of Tumor Vascularity in an Animal Model. A.C. Fleischer, W.E. Wojcicki, E.F. Donnelly, D.R. Pickens, G. Thirsk, G.B. Thurman, and C.G. Hellerqvist. J. Ultra. Med. 18: 547-551 (1999).

74. Isolation and Identification of of the Group B streptococcal toxin CM101 from infants with sepsis. Hakan W. Sundell, He-Ping Yan, Clint E. Carter, Barbara D. Wamil, kanning Wu, Rao Gadipatti, Dongbei Li, Mildred T. Stahlman, and Carl G. Hellerqvist. Journal of Pediatrics 137:338-344 (2000).

75. CM101 Treatment Overrides Tumor-induced Immunoprivilege Leading to Apoptosis. F. Michael Yakes, Barbara D. Wamil, Fenglei Sun, He-Ping Yan, Clint E. Carter, and Carl G. Hellerqvist. Cancer Research 60:5740-5746 (2000).

76. Identification of a Novel Membrane Protein HP59 with Therapeutic Potential as a Target of Tumor Angiogenesis. Changlin Fu, Smriti Bardhan, Nicolae D. Cetateanu, Barbara D. Wamil, Yufen Wang, He-Ping Yan, Clint E. Carter, Ergang Shi, Christo Venkov, F. Michael Yakes, David L. Page, R. Stephen Lloyd, and Carl G. Hellerqvist. Clinical Cancer Research, 7: 4182-4194 (2001)

77. CM101 Stimulates Cutaneous Wound Healing Through an Anti-Angiogenic Mechanism. Lillian B. Nanney, Barbara D. Wamil, Jeffrey Whitsitt, Nancy L. Cardwell, Jeffrey M. Davidson, He-Ping Yan, and Carl G. Hellerqvist. Angiogenesis 4: 61-70 (2001)

78. Macrophage stimulation using a Group B streptococcus exotoxin (CM101) leads to axonal

regrowth in the Injured Optic Nerve. Marcus Ohlsson, Per Mattsson, Barbara D. Wamil, Carl G. Hellerqvist and Michael Svensson. Restorative Neurology and Neuroscience. 22: 33-41 (2004)

79. [illegible]

80. [illegible] Molecular Cancer Therapeutics (To be submitted)

Abstracts:

1. A Quantitative Assay for Intercellular Adhesion and its Application to Cell Agglutination by Lectins. W.L. Rottman, C.G. Hellerqvist, J. Umbreit and B.T. Walter. Fed. Proc. 32:556 (1973).

2. Intercellular Adhesion as a Function of the Cell-Cycle Traverse. C.G. Hellerqvist. In Vitro 10:364 (1974).

3. Role of Complex Carbohydrates in Intercellular Adhesion of Synchronized Chinese Hamster Ovary Cells. C.G. Hellerqvist. Fed. Proc. 36:835 (1977).

4. Physiologic Effects of Group B Streptococcal Extracellular Polysaccharide on Adult Unanesthetized Sheep. J. Rojas, R. Olegard, R.S. Green, C.G. Hellerqvist, H. Sundell, K.L. Brigham and M.T. Stahlman. Fed. Proc. 37:3364 (1978).

5. Accumulation of Lanosterol and Dihydrolanosterol in SV40 Transformed Swiss 3T3 Cells. K. Krueger and C.G. Hellerqvist. Fed. Proc. 37:2158 (1978).

6. Biochemical Studies on the Adhesion of Human Fibroblasts to an Extracellular Matrix. C.E. Schwartz, C.G. Hellerqvist and L.W. Cunningham. Fed. Proc. 37:647 (1978).

7. Induction of Intercellular Adhesion of Chinese Hamster Ovary Cells. K.E. Krueger and C.G. Hellerqvist. Fed. Proc. 39:2349 (1980).

8. Identification of 2-acetamido-2-deoxytetrose in a Lipid-Linked Oligosaccharide from Rat Liver. D.A. Cumming, C.G. Hellerqvist and O. Touster. Fed. Proc. 39:1549 (1980).

9. Mechanism of Induction of Intercellular Adhesion. K.E. Krueger and C.G. Hellerqvist. Fed. Proc. 40:1588 (1981).

10. Granulocyte Response to Type III, Group B Streptococcal (GBS) Toxin. J. Rojas, L.E. Larsson, C.G. Hellerqvist, K.L. Brigham and M.T. Stahlman. Clin. Res. (1981).

11. Structural Analysis of an Extracellular Toxic Polysaccharide. C.G. Hellerqvist. Fed. Proc. 41:5167 (1982).

12. Mechanism of Intercellular Adhesion. C.G. Hellerqvist and K.E. Krueger. 12th International Congress of Biochemistry, Perth, Australia.

13. Cell Adhesion to an Extracellular Matrix In Vitro. J.O. Gailit and C.G. Hellerqvist. Fed. Proc. 43:1003 (1984).

14. The Role of Granulocytes in the Lung Function Response to Group B Streptococcal Toxin in Young Lambs. K. Sandberg, B. Engelhardt, D. Bratton, A. van den Abbeele, J. Grogaard, C.G. Hellerqvist and H. Sundell. Clin. Res. (1984).

15. Molecular Basis for Group B b-Hemolytic Streptococcal (GBS) Virulence. C.G. Hellerqvist, P. Gettins and H. Sundell. Fed. Proc. 44:8134 (1985).

16. Role of vWF Oligosaccharides in Platelet Adhesion. C.G. Hellerqvist, R. Sinatra and J. Siegel. Glycoconjugates Proceedings of the VIIIth International Symposium 2:389 (1985).
17. Comparative Studies of Group B b-Hemolytic Streptococcal Disease. C.G. Hellerqvist, H. Sundell and P. Gettins. Annual Meeting of the Society for Complex Carbohydrates (1986).

18. Molecular Mechanism of Group B b-Hemolytic Disease. C.G. Hellerqvist, H. Sundell and P. Gettins. Annual Meeting of the Society for Complex Carbohydrates (1986).

19. Plasmid Dependent Toxin Production by Group B Streptococcus Type II and Type III. H. Sundell, W. Fisk, T. Perry-Marion, P. Gettins and C.G. Hellerqvist. Society for Pediatric Research 21-2:1485 (1987).

20. A Neonatal Polysaccharide Pathogen Produced by Group B b Streptococcus Type Ic and Type III. C.G. Hellerqvist, P. Gettins and H. Sundell. Annual Meeting of the Society for Complex Carbohydrates (1987).

21. Structural Studies on Group B Streptococcus Type III Polysaccharide Toxin. R.S. Pappas, B. Sweetman and C.G. Hellerqvist. Annual Meeting of the Society for Complex Carbohydrates (1987).

22. Studies on GBS Toxin. A Polysaccharide Pathogen Produced by Group B b-Hemolytic Streptococcus. B.A. Russell, R.A. Nelson and C.G. Hellerqvist. Annual Meeting of the Society for Complex Carbohydrates (1987).

23. On The Utility o 13C-NMR Spectroscopy in the Identification of the Primary Structures of Manno-Oligosaccharides and Glycopeptides. D. Cumming and C.G. Hellerqvist. XIVth International Carbohydrate Symposium, 1988 Stockholm, Sweden.

24. Use of Polyclonal Rabbit Anti-GBS Toxin IgG for Localization of a Possible Toxin Binding Site in Sheep Lung Tissue. B. Russell, R. Pappas, J. Brandt, H. Sundell and C.G. Hellerqvist. Annual Meeting of the Society for Complex Carbohydrates Glycoconj. J. 5:298 (1988).

25. Automated Computer Analysis of Data from Oligosaccharide Fast-Atom-Bombardment Mass Spectrometry. S. Ray, S. Pappas and C.G. Hellerqvist. Annual Meeting of the Society for Complex Carbohydrates Glycoconj. J. 5:293 (1988).

26. Oligosaccharide Monomer Sequence Determination Using Fast-Atom Bombardment Mass Spectrometry of Periodate Oxidized Acetate Ester Derivatives. R.S. Pappas, B. Sweetman, S. Ray and C.G. Hellerqvist. Annual Meeting of the Society for Complex Carbohydrates Glycoconj. J. 5:293 (1988).

27. Effect of Leukotriene Antagonist FPL 57231 on Cardiopulmonary Function in Piglets Treated

with Group B Streptococcal Exotoxin GBS Toxin. H. Osioyich, R.N. Goldberg, L. Suguihara, C.G. Hellerqvist, D. Mehre and E. Bancalari. Society for Pediatric Research 25-2:1660 (1989) Immunological and Histochemical Studies on the Pathophysiology of Group B Streptococcal Toxin as Manifested in Early Onset Disease. B. Russell, R.S. Pappas, D. Brandt, H. Sundell and C.G. Hellerqvist. Xth International Symposium on Glycoconjugates, Jerusalem Israel (1989).

28. Sequence Analysis of Complex Carbohydrates via Peracetylated Polynitrile Derivatives. R.S. Pappas, B.J. Sweetman, S. Ray and C.G. Hellerqvist. Ann Arbor Meeting of the Society for Complex Carbohydrates, Glycoconj. J. 6:413 (1989).

29. Immunological and Histochemical Studies on the Pathophysiology of Group B Streptococcal Toxin a Manifested in Early Onset Disease. B. Russell, R.S. Pappas, D. Brandt, H. Sundell and C.G. Hellerqvist. Ann Arbor Meeting of the Society for Complex Carbohydrates, Glycoconj J. 6:399 (1989).

30. GBS-Toxin; From Neonatal Pathogen to Anti-Tumor Agent. C.G. Hellerqvist, D.L. Page, G.B. Thurman, B.A. Russell, H.W. Sundell and J.M. Brandt. Glycoconj. J. 8:175 (1991).

31. A Micro Analytical Method for Quantitative and Qualitative Carbohydrate Analysis. Y.-F. Wang, D.A. Wittmer, C. Dorschel and C.G. Hellerqvist. XVIth International Carbohydrate Symposium, Paris, France (1992).

32. Anti-Tumor Effects of GBS Toxin are Caused by Induction of a Targeted Inflammatory Reaction. C.G. Hellerqvist, G.B. Thurman, D.L. Page, Y.-F. Wang, T.J. Gensler, T.D. Mitchell and H.W. Sundell. Glycobiology 2:471 (1992).

33. Dose-Dependent Induction of Tumor Necrosis Factor a by GBS Toxin in Mice. T.D. Mitchell, G.B. Thurman, Y.-F. Wang, D.L. Page, H.W. Sundell and C.G. Hellerqvist. Glycobiology 2:486 (1992).

34. Micro Analytical Technologies in Carbohydrate Structural Analysis. Y.-F. Wang, Carlos J. Castillo, Douglas Wittmer, Craig Dorschel and Carl G. Hellerqvist. Glycobiology 2:457 (1992).

35. Induction of TNF-a Production in Tumor-Bearing Mice by GBS Toxin. G.B. Thurman, T.D. Mitchell, Y.-F. Wang, D.P. Page, H.W. Sundell and C.G. Hellerqvist. Society for Leukocyte Biology, Supplement 3:52 (1992).

36. Thromboxane Receptor Blockage (SQ 29548) in Group B Streptococcal (GBS) Toxin Challenge in Young Lambs. Kenneth Sandberg, Karl Erik Edberg, Wendy Fish, Robert Parker, Carl Hellerqvist and Hakan Sundell. Society for Pediatric Research 31 (1992).

37. Anti-Tumor Effects of GBS Toxin Are Caused By Induction of a Targeted Inflammatory

Reaction. C.G. Hellerqvist, G.B. Thurman, D.L. Page, Y.-F. Wang, T.J. Gensler, T.D. Mitchell and H.W. Sundell. 22nd Annual Keystone Symposium, Silverthorne, Colorado (1993).

38. Induction of Lymphokine Production in Tumor-Bearing Mice by GBS Toxin. G.B. Thurman, T.D. Mitchell, Y.-F. Wang, D.L. Page, H.W. Sundell, B.A. Russell and C.G. Hellerqvist. Journal of Immunology 150:219A (1993).

39. GBS Toxin: An Inflammatory Agent With Anti-Tumor Activity. C.G. Hellerqvist, G.B. Thurman, B.A. Russell, Y.-F. Wang, G.E. York, D.L. Page, H.W. Sundell and C. Castillo. Glycoconj. J. 10:313 (1993).

40. GBS Toxin: Mechanism of Anti-Tumor Activity. C.G. Hellerqvist, G.B. Thurman, B.A. Russell, Y.-F. Wang, G.E. York, D.L. Page, H.W. Sundell and C. Castillo. Glycobiology 3:517 (1993).

41. GBS Toxin May Induce Tumor Targeted Inflammation Via Complement Activation and TNFa and IL-1 Induction. C.G. Hellerqvist, G.B. Thurman, B.A. Russell, D.L. Page, Y.-F. Wang and C. Castillo. Proceedings of American Association of Cancer Research, Orlando, Florida (1993).

42. Anti-Tumor Effects of GBS Toxin are Caused by Induction of a Targeted Inflammatory Reaction. C.G. Hellerqvist, G.B. Thurman, D.L. Page, Y.-F. Wang, T.J. Gensler, T.D. Mitchell and H.W. Sundell. Proceedings of NATO/ASI - Angiogenesis: Molecular Biology, Clinical Aspects, Rhodes, Greece (1993).

43. Anti-Tumor Effects of GBS Toxin: Caused by Induction of a Targeted Inflammatory Reaction. C.G. Hellerqvist, G.B. Thurman, D.L. Page, B.A. Russell, Y.-F. Wang, T.D. Mitchell and H.W. Sundell. Proceedings of the 18th International Congress of Chemotherapy, Stockholm, Sweden (1993).

44. GBS Toxin: Mechanism of Anti-Tumor Activity. C.G. Hellerqvist, G.B. Thurman, B.A. Russell, Y.-F. Wang, G.E. York, D.L. Page, H.W. Sundell and C. Castillo. Glycobiology, Vol. 3, No. 5 (1993).

45. Identification of Na+-pump Inhibitors in Rat Urine. M. Tamura, T.M. Harris, D. Phillips, Y.-F. Wang, C.G. Hellerqvist, S.K. Lam and T. Inagami. Experimental Biology 94 (1993).

46. CM101 (GBS Toxin): Preclinical and Clinical Evidence for a Tumor-Targeted Induction of Inflammation. C.G. Hellerqvist, G.B. Thurman, D.L. Page, Y.-F. Wang, C. Castillo, E. Wang, S. Bardhan, N.S. Mason and H.W. Sundell. Journal of Chemotherapy (1994).

47. Cytokine Production in Cancer Patients in Response to CM101, a Polysaccharide Exotoxin from Group B Streptococcus (GBS). G.B. Thurman, B.D. Wamil, H. Yan, M. Zhang, D.H. Johnson, R.F. DeVore, G.B. Wakefield and C.G. Hellerqvist. 30th National Meeting of

the Society for Leukocyte Biology (1994).

48. Preliminary Results of a Phase I Trial of CM101 in Cancer Patients. C.G. Hellerqvist, R.F. DeVore, H.W. Sundell, G.B. Thurman, B.D. Wamil, G.B. Wakefield and D.H. Johnson. 30th National Meeting of the Society for Leukocyte Biology (1994).
49. Preliminary Results of a Phase I Trial of CM101 in Cancer Patients. C.G. Hellerqvist, G.B. Thurman, B.D. Wamil, R.F. DeVore, H.W. Sundell, D.L. Page, M. Zhang, C. Carter, H. Yan, G.B. Wakefield and D.H. Johnson. American Association for Cancer Research Special Conference - Translational Research in Cancer: New Opportunities for Progress (1994).

50. Preliminary Results of a Phase I Trial of CM101 in Cancer Patients. C.G. Hellerqvist, G.B. Thurman, B.D. Wamil, R.F. DeVore, H.W. Sundell, D.L. Page, M. Zhang, C. Carter, H. Yan, G.B. Wakefield and D.H. Johnson. Keystone Symposia - Cancer Cell Invasion and Motility (1995).

51. Early Results of a Phase I Trial of CM101 in Cancer Patients. C.G. Hellerqvist, R.F. DeVore, H.W. Sundell, G.B. Thurman, B.D. Wamil, D.L. Page, G.B. Wakefield and D.H. Johnson. Proceedings of American Association of Cancer Research Annual Meeting; Vol. 36:224 (1995).

52. Cytokine Production in Cancer Patients Receiving the Anti-Neovascularization Drug CM101. C. Hellerqvist, R. DeVore, G. Thurman, B. Wamil, M. Zhang, G. Wakefield, H. Sundell, C. Carter, H. Yan and D. Johnson. Proceedings of the American Society of Clinical Oncology Meeting; Vol. 4:487 (1995).

53. A Phase I Study of the Anti-Neovascularization Drug CM101. R. DeVore, D.R. Johnson, C. Hellerqvist, G. Wakefield, P. Browning, D. Page, H. Sundell and D.H. Johnson. Proceedings of the American Society of Clinical Oncology Meeting; Vol. 4:488 (1995).

54. Enhanced IL-6 Response in Tumor-Bearing Mice Injected with CM101: A Carbohydrate Isolated from Group B Streptococcus. G.B. Thurman, B.D. Wamil, T.E. Quinn, M. Zhang and C.G. Hellerqvist. The Immunologist (1995).

55. Interleukin-12 mRNA Expression in Monocytes, Lymphocytes and Granulocytes of Cancer Patients by CM101 Treatment. E. Wang, S. Lloyd, S. Bardhan and C.G. Hellerqvist. The Immunologist (1995).

56. Elevated Serum Soluble E-Selectin in Cancer Patients Treated with CM101. B.D. Wamil, G.B. Thurman, R.F. DeVore, G. Wakefield, D. Johnson and C.G. Hellerqvist. The Immunologist (1995).

57. Pharmacokinetic Study of Cytokine Responses of Cancer Patients Treated with CM101 - A Polysaccharide Anti-Cancer Agent Isolated from Group B Streptococcus. C.G. Hellerqvist, B.D. Wamil, H. Yan, M. Zhang, R.F. DeVore, G.B. Wakefield, G.B. Thurman and D.H. Johnson. The Immunologist (1995).

58. Systemic Cytokine Levels in Cancer Patients Receiving the Anti-Neovascularization Drug CM101. C.G. Hellerqvist, R. DeVore, G.B. Thurman, B.D. Wamil, M. Zhang, G. Wakefield, H.W. Sundell, C. Carter, H. Yan and D. Johnson. Proceedings of the 19th International Congress of Chemotherapy.

59. Progress in Developing CM101, a Bacterial Polysaccharide, as an Anti-Neovascularization Drug in Cancer Patients. C.G. Hellerqvist, R. DeVore, G.B. Thurman, B.D. Wamil, H. Yan, C. Carter, H.W. Sundell, M. Zhang, G.B. Wakefield and D.H. Johnson. Glycoconj. J. 12:557 (1995).

60. CM101: Preclinical and Clinical Evidence for Targeting Pathologic Neovasculature in Tumors. C.G. Hellerqvist, G.B. Thurman, B.D. Wamil, R.F. DeVore, H.W. Sundell, D.L. Page, M. Zhang, C. Carter, H. Yan, G.B. Wakefield and D.H. Johnson. Proceedings of NATO/ASI - Angiogenesis: Molecular, Cellular and Clinical Aspect of Angiogenesis, Halkidiki, Greece (1995).

61. Modulation of Interleukin-12 mRNA Expression in Leukocytes of Cancer Patients Treated with CM101. C.G. Hellerqvist, Steve Lloyd, Enze Wang and Smriti Bardhan. Annals of the New York Academy of Sciences Interleukin 12: Cellular and Molecular Immunology of an Important Regulatory Cytokine, p. 525-527 (1995).

62. Leukocyte Activation in Response to CM101 Treatment of Cancer Patients. B.D. Wamil, J.O. Price, P.A. Minton, H.W. Sundell, G.B. Thurman, H. Yan, C. Carter and C.G. Hellerqvist. Proceedings of the American Association for Cancer Research 87th Annual Meeting, Vol. 37:487 (1996).

63. CM101 Induces a Complement-Activated Inflammatory Response Targeting Tumor Neovasculature. C.G. Hellerqvist, H. Yan, C. Carter, L. Liu, B.D. Wamil, D.L. Page, G.B. Thurman and H.W. Sundell. Proceedings of the American Association for Cancer Research 87th Annual Meeting, Vol. 37:487 (1996).

64. Identification of GBS Toxin in Neonatal Fluids from Group B Streptococcus (GBS) Infected Neonates. C.G. Hellerqvist, H. Yan, C. Carter, K. Wu and H.W. Sundell. American Society for Microbiology 96th General Meeting (1996).

65. Preclinical and Clinical Evidence for a Mechanism of Action of CM101 - An Anti-Tumor Agent Targeting Pathologic Neovasculature. C.G. Hellerqvist, H. Yan, C. Carter, L. Liu, D.L. Page, G.B. Thurman, R.F. DeVore and H.W. Sundell. 9th NCI-EORTC Symposium on New Drugs in Cancer Therapy (1996).

66. Isolation and Identification of Group B b-hemolytic Streptococcal (GBS) Toxin from Septic Newborn Infants. Hakan W. Sundell, Heping Yan, Kanning Wu, Barbara D. Wamil, Rao Gaddipati, Clint E. Carter, Mildred T. Stahlman and Carl G. Hellerqvist. Pediatr. Res. 39:302A (1996).

67. Evolution of an Anti-Neovascularization Agent from a Neonatal Pathogen. C.G. Hellerqvist,

H. Yan, E. Wang, L. Liu, B.D. Wamil, G.B. Thurman, C. Carter, R.F. DeVore and H.W. Sundell. Sixth World Congress on Microcirculation (1996).

68. A Phase I Study of the Antineovascularization Drug CM-101. R. DeVore, C. Hellerqvist, G. Wakefield, B. Wamil, G. Thurman, H. Sundell, R. Jotte, H. Yan, C. Carter, Y.-F. Wang, G. York, M. Zhang and D. Johnson. Proceedings of the American Society of Clinical Oncology Annual Meeting, Vol. 15:489 (1996).

69. CM101 - Anti-Tumor Activity and Mechanism of Action as an Anti-Neovascularization Agent. C.G. Hellerqvist, E. Wang, H. Yan, C. Carter, B.D. Wamil, D.L. Page, L. Liu and G.B. Thurman. Cancer Detection and Prevention (1996).

70. Activation of Leukocytes in Response to CM101 Treatment of Cancer Patients. J.O. Price, B.D. Wamil, H.W. Sundell, G.B. Thurman, D.H Johnson and C.G. Hellerqvist. Communications of Clinical Cytometry (1996).

71. Isolation and Identification of Group B b-Hemolytic Streptococcal (GBS) Toxin from Septic Newborn Infants. Hakan W. Sundell, Heping Yan, Kanning Wu, Barbara D. Wamil, Rao Gaddipati, Clint E. Carter, Mildred T. Stahlman and Carl G. Hellerqvist. European Respiratory Society, Annual Congress Stockholm (1996).

72. Evolution of an Anti-Neovascularization Agent from a Neonatal Pathogen. C.G. Hellerqvist. Proceedings of NATO/ASI - Angiogenesis: Models, Modulators, and Clinical Applications, Rhodes, Greece (1997).

73. Clinical and Preclinical Evidence for a Mechanism of Action of CM101 - An Anti-Tumor Agent Targeting Pathologic Neovasculature. Carl G. Hellerqvist, Enze Wang, He-Ping Yan, Clint E. Carter, Barbara D. Wamil, David L. Page, David H. Johnson and Russell F. DeVore. American Association for Cancer Research Special Conference on Cell Signaling and Cancer Treatment (1997).

74. Clinical and Preclinical Evidence for a Mechanism of Action of CM101 - An Anti-Tumor Agent Targeting Pathologic Neovasculature. Carl G. Hellerqvist, Enze Wang, He-Ping Yan, Clint E. Carter, Barbara D. Wamil, David L. Page, David H. Johnson and Russell F. DeVore. ACS Symposium on Carbohydrate-Based Anti-Inflammatory Chemotherapy (1997).

75. CM101 Inhibits VEGF Induced Tumor Neovascularization as Determined by MRI and RT-PCR. B.D. Wamil, R. Abramovitch, E. Wang, M. Neeman and C.G. Hellerqvist. 88th Annual American Association for Cancer Research Meeting, Vol. 38:237 (1997).

76. Mapping Neovascularization and Anti-Neovascularization Therapy: Correlation Between NMR and Light Microscopy. R. Abramovitch, D. Frenkiel, G. Meir, C. Hellerqvist and M. Neeman. International Society for Magnetic Resonance in Medicine Fifth Scientific Meeting (1997).

77. Evidence of Induced Apoptosis in Cancer Patients Treated with CM101. C.G. Hellerqvist, E.

Wang, B.D. Wamil, J.O. Price, H.-P. Yan, C.E. Carter, Y.-F. Wang, R.F. DeVore, D.H. Johnson and R.S. Lloyd. American Society of Clinical Oncology Annual Meeting, Vol. 16:546a (1997).

78. CM101, an Anti-Angiogenesis Agent, Downregulates VEGF Expression in Glioma Tumor Models as Measured by RT-PCR. B. Wamil, E. Wang, Y.-F. Wang, R. Abramovich, M. Neeman, A. Wamil and C. Hellerqvist. XIVth International Symposium on Glycoconjugates (1997).

79. CM101 - Evidence of an Anti-Pathoangiogenic Mechanism of Action. B.D. Wamil, F.M. Yakes, G.B. Thurman, S. Juliao, C. Venkov, D.L. Page and C.G. Hellerqvist. 89th Annual Meeting of the American Association for Cancer Research (1998).

80. CM101 Treatment Overrides Tumor-Induced Immunosuppression and Induces Apoptosis in Adenocarcinoma Metastasis. B.D. Wamil, F.M. Yakes, D.L. Page, Y.-F. Wang, G.B. Thurman, R.S. Lloyd, R.F. DeVore, D.H. Johnson, and C.G. Hellerqvist. American Society of Clinical Oncology Annual Meeting (1998).

81. CM101: An Anti-Pathoangiogenic Polysaccharide Induces Apoptosis in Adenocarcinoma Metastasis. B.D. Wamil, F.M. Yakes, D.L. Page, H.-P. Yan, C.E. Carter, R.S. Lloyd, H.W. Sundell, R.F. DeVore, D.H. Johnson, and C.G. Hellerqvist. 10th NCI-EORTC Symposium on New Drugs in Cancer Therapy (1998).
82. CM101: An Anti-Pathoangiogenic Polysaccharide - Harnessing a Powerful Array of Biological Effects. C.G. Hellerqvist. International Glyco-BioTechnology Symposium (1998).

83. A Quantitative Assay Using Basement Membrane Extracts and Embryonic Stem Cells to Study the Effects of Estrogen on Developing Vascular Endothelium In Vivo. C. Venkov, N. Vorobieff, B. Wamil, F. Sun, M. Yakes, and C. Hellerqvist. 20th European Conference on Microcirculation (1998).

84. CM101: An Anti-Pathoangiogenic Polysaccharide Reduces Immunoprivilege of Tumors. B.D. Wamil, F.M. Yakes, D.L. Page, H.-P. Yan, C.E. Carter, H.W. Sundell, C. Fu, S. Bardhan, D.H. Johnson, and C.G. Hellerqvist. Impact of Biotechnology on Prediction, Prevention and Treatment (1998).

85. CM101: An Anti-Pathoangiogenic Polysaccharide Reduces Immunoprivilege of Tumors. B.D. Wamil, F.M. Yakes, P. Chi, E. Shi, H.-P. Yan, C.E. Carter, D.L. Page, H.W. Sundell, G.B. Thurman, C. Fu, S. Bardhan, D.H. Johnson, and C.G. Hellerqvist. 1st International Conference on Biological Therapy and Modern Cancer Therapy (1998).

86. Expressional Cloning of CM101 Receptor Gene from Mammalian Cells. C. Fu, S. Bardhan, N.D. Cetateanu, E. Shi, H.-P. Yan, C.E. Carter, R.S. Lloyd, C. Venkov, F.M. Yakes, D.L. Page, and C.G. Hellerqvist. American Association for Cancer Research Annual Meeting (1999).

87. CM101 Up-Regulates p53 Specific DNA Binding Activity in an In Vivo Murine Melanoma

Model. F.M. Yakes, B.D. Wamil, F. Sun, D.L. Page, and C.G. Hellerqvist. American Association for Cancer Research Annual Meeting (1999).

88. Cytokine-Driven Inflammatory Response to CM101 in Tumor Neovasculature. Carl Hellerqvist, He-Ping Yan, Clint Carter, David Page, Barbara Wamil, F. Michael Yakes, and Gary Thurman. Keystone Symposium - Inflammatory Paradigms and the Vasculature (C4) (1999).

89. Effects of Estrogen on the Developing Vasculature. C. Venkov, N. Vorobieff, H.-P. Yan, B. Wamil, D. Page, and C. Hellerqvist. Keystone Symposium - Inflammatory Paradigms and the Vasculature (C4) (1999).

90. Recovery of Neurologic Function with CM101 Treatment after Surgical Removal of Gliosis in Chronic Spinal Cord Injury. C.G.Hellerqvist, A.W. Wamil, B.D. Wamil, F. Sun, and P. Chi. 29th Annual Meeting of the Society for Neuroscience (1999).

91. Recovery of Neurologic Function with CM101 Treatment after Surgical Removal of Gliosis in Chronic Spinal Cord Injury. C.G.Hellerqvist, A.W. Wamil, B.D. Wamil, F. Sun, and P. Chi. 17th Annual National Neurotrauma Society Meeting (1999).

92. Identification and Characterization of HP59: A Unique Pathoangiogenic Marker Targeted by CM101. C. Fu, N.D. Cetateanu, S. Bardhan, H.-P. Yan, C.E. Carter, R.S. Lloyd, F.M. Yakes, B.D. Wamil, D.L. Page, and C.G. Hellerqvist. American Association for Cancer Research Annual Meeting (2000).

93. CM101 Treatment Overrides Tumor-Induced Immunoprivilege Leading to Apoptosis. B.D. Wamil, F.M. Yakes, F. Sun, H.-P. Yan, C.E. Carter, and C.G. Hellerqvist. American Association for Cancer Research Annual Meeting (2000).

94. CM101 Accelerates Resurfacing by Decreasing Formation of Pathogenic Capillaries and Blood Flow During Cutaneous Wound Repair. L.B. Nanney, B.D. Wamil, J. Whitsitt, N.L. Cardwell, J.M. Davidson, and C.G. Hellerqvist. Wound Healing Society Educational Symposium (2000).

95. Effects of the Anti-Angiogenic Agent CM101 Following Optic Nerve Crush in the Adult Rat. M. Ohlsson, P. Mattsson, B.D. Wamil, C.G. Hellerqvist, and M. Svensson. Society for Neuroscience Annual Meeting (2000).

96. Effect of CM101 Plus Methylpredinisolone on the Recovery from Paralysis. B.D. Wamil, A.W. Wamil, and C.G. Hellerqvist. Society for Neuroscience Annual Meeting (2000).

97. CM101 Treatment Promotes GAP-43 Positive Axonal Regrowth Following Chronic Spinal Cord Injury. C.G. Hellerqvist, H.-P. Yan, P. Chi, F. Sun, A.W. Wamil, and B.D. Wamil. Society for Neuroscience Annual Meeting (2000).

98. The CM101 Target Protein HP59 is a Pathoangiogenic Marker with Potential as a Vaccine and Drug Target. Barbara D. Wamil, Yufen Wang, Fenglei Sun, He-Ping Yan, and Carl G.

Hellerqvist. AACR Annual Meeting (2001).

99. Cell Transplantation and CM101 Treatment Improves Locomotion in Chronically Paralyzed Mice. B.D. Wamil, Y. Wang, E.Y. Snyder, H. Yan, T. Tu, C.G. Hellerqvist. Society for Neuroscience Meeting (2001).

100. Effects of the Anti-Angiogenic Agent CM101 Following Complete Spinal Cord Injury in the Adult Rat. M. Ohlsson, P. Mattsson, C.G. Hellerqvist, I.A. Langmoen, B. Meijer, M. Svensson. Society for Neuroscience Meeting (2001).

101. Vaccines based on the CM101 target protein HP59 protects against pathoangiogenesis and tumor growth with no effect on reproduction. B.D. Wamil, Y. Wang, C. Fu, H. Yan, C.G. Hellerqvist, AACR_NCI_EORTC International Conference on Molecular Targets and Cancer Therapeutics (2001)

102. A Cancer Vaccine Based on the Pathoangiogenic Marker HP59 Induces a Cellular Immune Response Protecting Against Metastases Following I.V. Melanoma Infusions in Mouse Models. B.D. Wamil, Y. Wang, L. Geng, D. Hallahan, and C.G. Hellerqvist. AACR Conference on Frontiers in Cancer Prevention Research.(2002) Poster Discussion Session.

103. CM101 treatment in Acute, and coupled with Stem cells in Chronic Paralysis, C. G. Hellerqvist, B.D. Wa,mil and A.W. Wamil. ICCP ClinicaL Trials Workshop on Spinal Cord Injury, (2004) Workshop presentation.

96th Annual Meeting
April 16-20, 2005
Anaheim/Orange County, CA

Print this Page

Close this window

Session ID: Immunology 6
Session Title: Tumor Vaccines 1
Session Type: Poster Session
Sponsored by:
Session Start: 4/18/2005 1:00:00 PM
Session End: 4/18/2005 5:00:00 PM
Location: Exhibit Hall B-D, Anaheim Convention Center
Section Number: 30

Presentations:

3440--Monday, 1:00 p.m. - 5:00 p.m.--Preliminary hyperexpansion of mouse $CD34^{pos}$ stem cells provides multipotent dendritic cell (DC) precursors for tumor-DC hybridization and active immunization

3441--Monday, 1:00 p.m. - 5:00 p.m.--Manufacturing process of a dendritic cell vaccine for colorectal cancer phase I/II trial.

3442--Monday, 1:00 p.m. - 5:00 p.m.--Enhancement of DNA vaccine potency by co-administration of mature dendritic cells pulsed with a Pan-MHC class II peptide

3443--Monday, 1:00 p.m. - 5:00 p.m.--Modulation of tumor-derived exosomes for an efficient cancer vaccine

3444--Monday, 1:00 p.m. - 5:00 p.m.--Fusion process and fusion efficiency is essential to optimal antitumor immunity

3445--Monday, 1:00 p.m. - 5:00 p.m.--Screening of peptides that mimic MUC1 carbohydrate epitope as candidates for cancer vaccine

3446--Monday, 1:00 p.m. - 5:00 p.m.--MUC1-specific immune therapy is successful in rejecting colon cancer tumor cells in a MUC1-tolerant host

3447--Monday, 1:00 p.m. - 5:00 p.m.--Induction of a CD8+ T cell response to HPV16 E2 in HLA-A2 transgenic mice

3448--Monday, 1:00 p.m. - 5:00 p.m.--Antitumor activity human papillomavirus Type 16 E7-specific T cells in patients with virally infected squamous cell carcinoma of the head and neck (SCCHN)

3449--Monday, 1:00 p.m. - 5:00 p.m.--Induction of CD8 T lymphocytes specific for the recognition of a breast cancer-associated polymorphism in the HER2/neu protein in a clinical trial with the HER2 E75-peptide vaccine.

3450--Monday, 1:00 p.m. - 5:00 p.m.--Level of HER-2/neu protein expression in primary breast cancer may impact the development of HER-2/neu-specific endogenous immunity.

3451--Monday, 1:00 p.m. - 5:00 p.m.--Reduction of regulatory T cell levels and enhanced antitumor immune responses in breast cancer patients receiving a HER2 peptide (E75) vaccine.

3452--Monday, 1:00 p.m. - 5:00 p.m.--Serum cytokine levels in breast cancer patients before and after receiving a HER2/neu vaccine assessed using multiplex technology.

3453--Monday, 1:00 p.m. - 5:00 p.m.--Vaccination of rat HER-2/neu transgenic mice, with syngeneic rat HER-

2/neu, but not with xenogenic human ErbB receptors, prevents the development of spontaneous mammary carcinomas.

3454--Monday, 1:00 p.m. - 5:00 p.m.--Genetic immunization against rat HER2/neu in tumor challenge and spontaneous mouse tumor models

3455--Monday, 1:00 p.m. - 5:00 p.m.--Induction of effective and antigen-specific antitumor immunity by novel protein- and peptide-based ErbB2/HER2 vaccines

3456--Monday, 1:00 p.m. - 5:00 p.m.--Melanoma patients treated with an autologous dendritic cell vaccine demonstrate tumor reactive antibodies

3457--Monday, 1:00 p.m. - 5:00 p.m.--$CD4^+$ and $CD8^+$ T cells responding to dendritic cells transfected with *in vitro* transcribed (IVT)-RNA encoding melanoma antigen Melan-A/MART-1

3458--Monday, 1:00 p.m. - 5:00 p.m.--The clinical implication of expressions of melanoma antigen gene(MAGE) and synovial sarcoma on Xchromosome (SSX) genes in ovarian malignancies

3459--Monday, 1:00 p.m. - 5:00 p.m.--Use of ultraviolet-irradiated multiple myeloma cells as immunogens to generate tumor-specific cytolytic T lymphocytes

3460--Monday, 1:00 p.m. - 5:00 p.m.--Phase I clinical trial of VACCIMEL plus GM-CSF in melanoma patients stages IIB, III and IV.

3461--Monday, 1:00 p.m. - 5:00 p.m.--Generating human immune responses in humanized SCID/bg mice with U251MG glioma cells expressing the membrane form of macrophage colony stimulating factor (mM-CSF)

3462--Monday, 1:00 p.m. - 5:00 p.m.--Whole-cell lung cancer vaccine: Clinical experience with 27 patients

3463--Monday, 1:00 p.m. - 5:00 p.m.--Novel vaccine immunotherapy for B-cell malignancies using adenoviral delivery of αGalactosyltransferase gene

3464--Monday, 1:00 p.m. - 5:00 p.m.--Induction of specific antitumoral immunity in cancer patients with a dendritic cell (DC)- based protocol. A feasibility study

3465--Monday, 1:00 p.m. - 5:00 p.m.--A pilot study of dendritoma vaccine for stage IV renal cell carcinoma

3466--Monday, 1:00 p.m. - 5:00 p.m.--A pilot study of peripheral blood dendritic cells (PBDC) pulsed with NY-ESO-1 ISCOMATRIX® vaccine (ESO/IMX) in patients with treated cancer and minimal residual disease at high risk of relapse

96th Annual Meeting
April 16-20, 2005
Anaheim/Orange County, CA

Citation format: Proc Amer Assoc Cancer Res 2005;46:[Abstract #].

96th Annual Meeting
April 16-20, 2005
Anaheim/Orange County, CA

Print this Page Close this window

Session ID: Immunology 10
Session Title: Tumor Vaccines 2
Session Type: Poster Session
Sponsored by:
Session Start: 4/19/2005 1:00:00 PM
Session End: 4/19/2005 5:00:00 PM
Location: Exhibit Hall B-D, Anaheim Convention Center
Section Number: 31

Presentations:

5147--Tuesday, 1:00 p.m. - 5:00 p.m.--A comparative analysis of tumor immunity induced by peptide or cell-based vaccination.

5148--Tuesday, 1:00 p.m. - 5:00 p.m.--Induction of an antigen cascade by diversified subcutaneous/intratumoral vaccination is associated with antitumor responses

5149--Tuesday, 1:00 p.m. - 5:00 p.m.--Antigen specific T-cell responses following whole tumor cell vaccination

5150--Tuesday, 1:00 p.m. - 5:00 p.m.--Preclinical evaluation of fully synthetic unimolecular penta-antigenic carbohydrate antigen as a cancer vaccine

5151--Tuesday, 1:00 p.m. - 5:00 p.m.--Ganglioside GD1a, present in Ovarian Cancer cells, Ascites and Sera of patients elicits endogenous IgM response.

5152--Tuesday, 1:00 p.m. - 5:00 p.m.--A DNA-based cancer vaccine activates both innate and adaptive immunity by engaging the NKG2D receptor

5153--Tuesday, 1:00 p.m. - 5:00 p.m.--A novel stress protein, legumain, is a target for a genetic vaccine against breast cancer

5154--Tuesday, 1:00 p.m. - 5:00 p.m.--Recombinant *Listeria* induce and boost antigen-specific immune responses in the presence of *Listeria*-specific cellular and humoral immunity

5155--Tuesday, 1:00 p.m. - 5:00 p.m.--Immunization with genetic vectors expressing rhesus CEA efficiently breaks immune tolerance in mice and rhesus monkeys.

5156--Tuesday, 1:00 p.m. - 5:00 p.m.--Does adenoviral vector replicative capacity influence the efficiency of antigen-specific immune response induction by Ad-transduced dendritic cells?

5157--Tuesday, 1:00 p.m. - 5:00 p.m.--Development of a whole cell vaccine for acute myeloid leukaemia: a comparison of B7-1, B7-2 and 4-1BBL

5158--Tuesday, 1:00 p.m. - 5:00 p.m.--Evaluation of a poxvirus vaccine target human p53 in a novel murine model

5159--Tuesday, 1:00 p.m. - 5:00 p.m.--Immunogenic and antitumor efficiency of plasmid DNA and Adenovirus vectors encoding CEA fusion proteins.

5161--Tuesday, 1:00 p.m. - 5:00 p.m.--Vaccination with sulfhydryl-based idiotype-carrier protein conjugates elicits

therapeutic anti-tumor immunity superior to glutaraldehyde conjugates in the A20 murine lymphoma model.

5162--Tuesday, 1:00 p.m. - 5:00 p.m.--Immunization of Rhesus monkeys with a conjugate vaccine IGN402 induces immune responses against carbohydrate and protein antigens, and cancer cells: correlation with cytokine release

5163--Tuesday, 1:00 p.m. - 5:00 p.m.--Preclinical evaluation of an hGM-CSF DNA-cationic lipid complexed autologous tumor cell vaccine using dogs with spontaneously arising non-Hodgkin's lymphoma as a model

5164--Tuesday, 1:00 p.m. - 5:00 p.m.--Temporal induction of a beneficial inflammatory cytokine milieu relative to peptide vaccination is crucial for the optimal adjuvanticity of the TLR3 agonist polyinosinic-polycytidylic acid (Poly I:C)

5165--Tuesday, 1:00 p.m. - 5:00 p.m.--High affinity MHC class II epitopes can be accurately predicted with publicly available algorithms

5166--Tuesday, 1:00 p.m. - 5:00 p.m.--Potent tumor-specific immunity induced by an *in vivo* heat shock protein-suicide gene based tumor vaccine

5167--Tuesday, 1:00 p.m. - 5:00 p.m.--The endogenous danger signaling molecule, uric acid, converts immunity from non-protective to protective when used as a vaccine adjuvant.

5168--Tuesday, 1:00 p.m. - 5:00 p.m.--Mechanism of antitumor immunity induced by an anti-idiotype antibody pulsed dendritic cells vaccine in a murine model transgenic for human carcinoembryonic antigen (CEA)

5169--Tuesday, 1:00 p.m. - 5:00 p.m.--Chaperone-rich cell lysate (CRCL) possesses a high carrying capacity for antigenic peptides leading to enhanced CTL activation

96th Annual Meeting
April 16-20, 2005
Anaheim/Orange County, CA

Citation format: Proc Amer Assoc Cancer Res 2005;46:[Abstract #].

Presented at the AACR Conference on Frontiers in Cancer Prevention Research. (2002) Poster Discussion Session.

A cancer vaccine based on the pathoangiogenic marker HP59 gives a cellular immune response protecting against repeated i.v. melanoma infusions in mouse models.

Barbara D. Wamil1, Yufen Wang1, Ling Geng2, Dennis Hallahan2 and Carl G. Hellerqvist1,2, Department of Biochemistry and Medicine2 Vanderbilt University, School of Medicine and The Vanderbilt Ingram Cancer Center, Nashville, TN 37232

We recently reported the expression cloning of HP59, (Gen Bank AF 244 577) the human target protein for CM101/GBS toxin (1), a bacterial toxin derived from culture media of Group B Streptococcus. CM101/GBS toxin, able to induce respiratory distress in an animal model, has been isolated and identified from body fluids of newborn babies suffering from respiratory distress (2). CM101 in the clinic induced an inflammatory response targeting only tumor vasculature (3,4) and induced an inflammatory reaction which, effectively broke down the tumor immuno privilege (5). The HP59 protein was shown by immunohistochemistry (IHC) to be present in neonatal lung endothelium for less then 8 days after birth consistent with the pathophysiology of GBS infections in the newborn baby (2). HP59 was shown by IHC to be present also in pathologic human tumor vasculature but not in the normal vasculature suggesting that the protein may be critical to embryogenic and pathologic angiogenesis (1). Mice and humans share the age dependent suseptibility to GBS infections and the monoclonal antibodies (mAb) generated to HP59 or the sheep homologue SP55 (87%) (AF 244578) derived peptides stained pathologic vasculature also in mice. HP59 has a unique 41 amino acid (aa) sequence at the N-terminal with no homology to any human protein and the peptide H3 used below as a single immunogen is composed of aa 8-28. The uniqueness of HP59 to pathologic vasculature led us to test KLH conjugated synthetic peptides based on the HP59 and SP55 sequences as a vaccine against cancer. C57 mice were immunized with a mixture of three HP59 (H1 aa 50-63, H2 aa 112-125 and H3 aa 8-28) and two SP55 (P56 aa 9-35, P57 aa 71-84) derived peptides (100µg each) in Complete Freud's Adjuvant (CFA) twice over two weeks followed by immunizations with peptides alone in Incomplete CFA (ICFA). Seven male and five female mice were inoculated s.c. with Lewis Lung tumor cells. Five each of control mice were immunized with CFA and ICFA alone. Immunization resulted in a 62% attenuation of tumor growth ($p=0.025$) in the immunized mice (1). IHC analysis of tumor tissues demonstrated that the inhibition of tumor growth was due to inhibition of both the pathoangiogenesis and the

vasculogenesis processes in the tumor, evidenced by lack of both HP59 and CD34 positive vessels. In this study we show that female mice immunized with the same mixture of HP59 and SP55 peptides became resistant to i.v. infusions of melanoma cell suspensions (1,000 cells in 100µl PBS) repeated on days 1, 140 and 290. The control immunized mice died between days 45 and 101. One immunized mouse died on day 41 with no signs of cancer. The remaining 4 lived until sacrificed after >700 days. These female tumor resistant mice gave birth to normal size litter up to three times, demonstrating the specificity of HP59 to pathologic but not physiologic angiogenesis and vasculogenesis. The immunized mice outlived the mock-immunized mice by >600 days and none had tumor metastases develop in the lungs, which was common to all mock-immunized mice. All mice immunized with the mixture of five peptides P56, P57, H1, H2 and H3 showed a high antibody titer only to P56 (the sheep homologue), which was passed to the off-spring. If antibodies to P56 were inhibitory to tumor angiogenesis then the antibody should be lethal to the offspring by reacting with the lung vasculature in the newborn mice. This was not the case. To confirm that the humoral response was of little consequence groups of 12 C57 mice were immunized with P56 or with adjuvant alone according the protocol used with the mixed peptides. As previously, P56 gave an antibody titer by the sixth week at which time the mice were challenged with s.c. injections with 50,000 Lewis Lung tumors. The excellent immunogen P56 conjugated to KLH gave no attenuation of tumor growth compared to control in the s.c. Lewis Lung model (Data not shown). Likewise in the same model immunization with the human homologue H4 (human equivalent of P56) gave no attenuation of s.c. Lewis Lung tumor growth and vascularization (Data not shown). The mice immunized with the human peptides H2 and H3 and the KLH controls were challenged i.v. with 1,000 melanoma cells in 100µl PBS one week after the last immunization at which time the serum showed no titer for the antibodies. Immunization with individual peptides showed that H3, a unique 21 aa sequence at the N-terminal of HP59 (aa 8-28,) gave immunoprotection, evidenced by significant life extensions ($P<0.001$) in female and male C57 mice challenged with i.v. infusions of 1,000 melanoma cells on day 1 and 5,000 on day 60. To demonstrate a cellular immunity naive C57 mice, with subcutaneous windows containing readily observable B16 melanoma tumors, were transfused with white cells, which were isolated from the tumor resistant female mice, from the multiple antigen group, after the mice had been injected with a saturated solution of Rhodamine G6. The fluorescent donor T-cells accumulated in the melanoma tumor blood vessels within 15 min, extravesated into the tumor and ablated the tumor vasculature and the tumor, validating that the immune response was cellular. Similarly, T-cells obtained from H3 mice

following tumor challenges ablated the melanoma tumors within 24 hours. T-cells from control mice had no effect. These results suggest a therapeutic potential for the CM101 target protein HP59 both as a drug target and a vaccine against pathoangiogenesis and cancer. Supported by AngioPath Inc (CGH, BDW and YW, in which all have a financial interest) by CA 70937, the Lung SPORE (DH) and the Vanderbilt Ingram Cancer Center Fu et al. Clin. Cancer Res.,7: 4182-4194, (2001), (2) Sundell et al, J Pediatrics 137:338-344 (2000), (3) DeVore et al J. Clin. Can. Res. 3:365-372 (1997), (4) Wamil et al, J. Can. Res. Clin. Oncol. 123(3):173-179 (1997), (5) Yakes et al Cancer Research 60:5740-5746 (2000).